



AALBORG UNIVERSITY  
DENMARK

The Faculty of Engineering and Science  
The Study Board of Industry and Global Business Development

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# Curriculum for the MSc Programme in Operations and Management Engineering (Cand.polyt.)

Aalborg University  
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dekan



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## Preface

Pursuant to Act 261 of March 18, 2015 on Universities (the University Act) with subsequent changes, the following curriculum for the Master's programme in Operations and Management Engineering is stipulated. The programme also follows the Joint Programme Regulations and the Examination Policies and Procedures for the Faculties of Engineering and Science, The Technical Faculty of IT and Design, and The Faculty of Medicine.

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## **Chapter 1: Legal Basis of the Curriculum, etc.**

### **1.1 Basis in Ministerial Orders**

The Master's programme in Operations and Management Engineering is organised in accordance with the Ministry of Higher Education and Science's Order no. 1328 of November 15, 2016 on Bachelor's and Master's Programs at Universities (the Ministerial Order of the Study Programs) and Ministerial Order no. 1062 of June 30, 2016 on University Examinations (the Examination Order). Further reference is made to Ministerial Order no. 111 of January 30, 2017 (the Admission Order) and Ministerial Order no. 114 of February 3, 2015 (the Grading Scale Order) with subsequent changes.

### **1.2 Faculty Affiliation**

The Master's programme falls under the Faculty of Engineering and Science, Aalborg University.

### **1.3 Board of Studies Affiliation**

The Master's programme falls under the Board of Studies of Industry and Global Business Development under the School of Engineering and Science.

### **1.4 Body of External Examiners**

The Master's programme falls under the Body of External Examiners for Engineers (Ingeniørernes landsdækkende censorkorps (maskin)).

## Chapter 2: Admission, Degree Designation, Programme Duration and Competence Profile

### 2.1 Admission

#### **Applicants with a legal right of admission (retskrav):**

Applicants with the following degree are entitled to admission

- Bachelor degree in Manufacturing and Operations Engineering (AAU)

#### **Applicants without legal claim to admission:**

Bachelor's programmes qualifying students for admission:

- Bachelor degree in Global Business Engineering (AAU)
- Diplomingeniør – Eksportteknologi (AAU)
- Diplomingeniør – Industri og Produktion (AAU)
- Diplomingeniør – Eksport (IHK)
- Diplomingeniør - Global Business Development (VIA)

Students with another Bachelor degree may, upon application to the Board of Studies, be admitted following a specific academic assessment if the applicant is considered as having comparable educational prerequisites. The University can stipulate requirements concerning conducting additional exams prior to the start of study.

### 2.2 Degree Designation in Danish and English

Students completing the Master's programme are entitled to the Danish designation Civilingeniør, cand.polyt. i værdikæder og teknisk ledelse. The English designation is: Master of Science (MSc) in Engineering (Operations and Management Engineering).

### 2.3 The Programmes' Specification in ECTS Credits

The Master's programme is a 2-year, research-based, full-time study programme. The programme is set to 120 ECTS credits.

### 2.4 Competence profile on the diploma

The following competence profile will appear on the diploma:

#### **A Candidatus graduate has the following competency profile:**

A Candidatus graduate has competencies that have been acquired via a course of study that has taken place in a research environment.

A Candidatus graduate is qualified for employment on the labour market on the basis of his or her academic discipline as well as for further research (PhD programmes). A Candidatus graduate has, compared to a Bachelor, developed his or her academic knowledge and independence so as to be able to apply scientific theory and method on an independent basis within both an academic and a professional context.

## 2.5 Competence Profile of the Programme

The graduate of the Master programme exhibits the following characteristics:

### **Knowledge**

- Have knowledge (based on the highest level of international research) within the domain of management engineering in the global organization in selected areas such as
  - Technology development and deployment in global supply and value chains
  - Systems and process design and engineering in global supply and value chains
  - Use of technologies for the control and management of supply and value chains
  - Organizational design and development
  - Innovation, implementation and change management from an engineering perspective
- Understand the principles of the above-mentioned areas, can reflect upon their knowledge in these areas at a scientific level, and use their knowledge to identify problems and solutions using technology and an engineering approach as central means for this.

### **Skills**

- Excel in Analysing Complex Business Problems and Designing New Innovative Business systems and solutions by applying scientific methods and tools and general skills related to problem solving and systems design using technologies and an engineering approach within the domain of Global Operations and Innovation Management
- Are able to evaluate and select among scientific theories, methods, tools and general skills used for the conception, design, implementation and operation of global value chains, supply chains and business systems and participate in the development and implementation of novel and innovative technology-based concepts, systems and solutions
- Can apply theories, methods and concepts in different organizational and empirical settings in order to solve complicated technical problems in a societal context
- Can communicate research-based knowledge and discuss professional and scientific problems within the domain of global management with both peers and non-specialists.

### **Competencies**

- Can manage work and development in complex and unpredictable situations requiring new solutions
- Can independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility within the area of global operations and innovation management
- Can independently take responsibility for own professional development and specialisation.

## Chapter 3: Content and Organisation of the Programme

The programme is structured in modules and organised as a problem-based study. A module is a programme element or a group of programme elements aiming to give students a set of professional skills within a fixed time frame specified in ECTS credits, and concluding with one or more examinations within specific exam periods that are defined in the curriculum. Each semester has an overall theme which serves a focal point in both modules and the project work. The programme is based on a combination of academic, problem-oriented and interdisciplinary approaches and organised based on the following work and evaluation methods that combine skills and reflection:

- Lectures
- Classroom instruction
- Project work
- Workshops
- Exercises (individually and in groups)
- Teacher feedback
- Reflection
- Portfolio work.

The 3rd semester is allocated to gaining practical international experience. The semester will enable students to appreciate theoretical reflective work practice and cultural challenges. The aim of the semester is to

1. Gain practical experience within the subject field
2. Analyse and reflect on educational experiences and professional practice
3. Clarify the Master's Thesis topic.

### 3.1 Overview of the programme

All modules are assessed through individual grading according to the 7-point scale. All modules are assessed by external examination (external grading) or internal examination (internal grading or by assessment by the supervisor only).

Semester	Module	ECTS	Grading	Exam
1 <sup>st</sup>	Supply Chain Configuration	5	7-point scale	Internal
	Researching Business Systems	5	7-point scale	Internal
	Operation, Innovation and Organizational Configuration	5	7-point scale	Internal
	Operations Management and Supply Chain Configuration – an Integrative Approach	15	7-point scale	External
2 <sup>nd</sup>	Supply Chain Technologies	5	7-point scale	Internal
	Operations, Innovation and Organizational Improvement: Implementation Models and Tools	5	7-point scale	Internal
	Management Systems	5	7-point scale	Internal
	Integrating Operations Management and Supply Chain Methods	15	7-point scale	Internal
3 <sup>rd</sup>	A Operations and Supply Chain Management	30	7-point scale	Internal
	B Academic Internship	30	7-point scale	Internal
4 <sup>th</sup>	Master 's Thesis	30, possible 60	7-point scale	External

## 3.2 1<sup>st</sup> Semester

### 3.2.0 Problem Based Learning and Project Management

**Title:**

Problem Based Learning and Project Management  
(Problembaseret læring og projektledelse)

**Prerequisites:**

None, but the course is compulsory for students not acquainted to the Aalborg PBL model

**Objective:**

The objective is to make newly started Master students coming from institutions other than AAU prepared to enter the problem based learning environment at AAU and manage study projects in close collaboration with peers.

**Type of instruction:**

Three half day workshops centred around the individual student working with an individual challenge or curiosity in relation to using a PBL approach. Peer learning is also a hallmark, since the students will discuss and reflect their individual challenges/curiosities in a peer learning group.

**Learning outcomes:** After completion of the course the student should be able to

**Day 1:**

- describe and discuss the Aalborg PBL model based on the three key words: group work, project work, problem orientation
- identify an initial individual challenge when using a PBL approach

**Day2:**

- develop and practice peer feedback skills
- practice collaborative learning in a group
- design a plan of action to deal with an initial individual PBL challenge or curiosity

**Day 3:**

- practice presentation skills
- practice critical skills when giving feedback to peers
- reflect on own and peer skills in relation to PBL practice

**Form of examination:**

Internal assessment during the course/class participation according to the rules in the Examination Policies and Procedures of Faculty of Engineering and Science, Aalborg University. In this case the assessment is primarily based on the oral performance during the course, which means that the student has to be active during the course time and participate in discussions. The course is an integrated part of the project for those not acquainted to the Aalborg PBL model, and is a precondition for participation in the project

examination. In this way there will be no diploma for the course and it will not be visible on the academic transcripts.

**Evaluation criteria:**

Passed/not passed as stated in the Joint Programme Regulations

### 3.2.1 Supply Chain Configuration (5 ECTS)

Title: Supply Chain Configuration  
(Konfiguration af værdikæder)

Justification: This course will address the key choices an organization has to make when conceiving and designing its supply and value chain. This course is focused on the external configuration of the organizations supply and value chain in order to achieve high levels of effectiveness.

Objectives: Upon completion of the course, the student can:

#### *Knowledge*

- Understand the common and distinguishing features of manufacturing and service supply chains
- Explain how supply chain strategy helps drive competitiveness in terms of cost efficiency, quality, delivery responsiveness, and flexibility
- Describe a supply chain strategy including location choices, outsourcing/offshoring, order to delivery choices, collaboration with supply chain partners and sustainability
- Understand the use of control and coordination technologies in manufacturing and service supply chains.
- Understand the role of various supply chain drivers and metrics

#### *Skills*

- Identify the key supply chain drivers and the role of supply chain strategy in driving firm competitiveness
- Design a supply chain strategy for manufacturing and service organizations, which achieves strategic fit with business and market requirements

#### *Competencies*

- Conceive and design a supply chain strategy which includes technological opportunities and technologies

Type of instruction: The learning objectives are realised via lectures, discussions and case work (see chapter 3).

Exam format: Internal oral/written examination

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.2.2 Researching Business Systems (5 ECTS)

Title: Researching Business Systems  
(Studier af forretningsystemer)

Justification: This course has focus on the methodological approaches, tools and techniques necessary for creating and analyzing data in the semester projects which are reliable and valid. Focus is both on quantitative and qualitative data.

Objective: Upon completion of the course, the student can:

#### *Knowledge*

- Understand methodological approaches and tools for studying organizations and supply and value chains
- Understand and explain of the key methodological trade-offs between different scientific methods when studying organisations and supply and value chains
- Understand the key approaches to increase the quality of data collection
- Describe different methods to analyse both quantitative and qualitative data
- Explain statistical methods and technologies for structuring and analyzing large datasets – including analytical approaches for handling “Big-Data”

#### *Skills*

- Identify and apply appropriate research methods necessary for analyzing and improving global business processes.
- Evaluate different strategies and approaches for data collection and analysis.
- Use statistical methods for data analysis

#### *Competencies*

- Select and operationalise appropriate quantitative and qualitative approaches to data collection and analysis
- Collect reliable and valid data.

Type of instruction: The learning objectives are realised via lectures, discussions and case work (see chapter 3).

Exam format: Internal oral/written examination

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.2.3 Operations, Innovation and Organizational Configuration (5 ECTS)

Title: Operations, Innovation and Organizational Configuration  
(Konfigurering af produktion, innovation og organisation)

Justification: This course has an internal focus and is thus looking inward in the organization. This course addresses the key strategic choices an organization has to make in order to conceive and design an effective internal configuration with regard to operation and innovation. The course also acknowledges that this takes place within and organizational context which must be understood and taken into account.

Objective: Upon completion of the course, the student can:

#### *Knowledge*

- Understand key structural and infrastructural choices within the design of manufacturing and service systems
- Explain of the role of technology in design of an operations strategy
- Describe key organizational design options in connection with creating an effective organization
- Understand key strategic choices and trade-offs within operations and innovation strategy design.

#### *Skills*

- Evaluate the strategic role of operations and innovation for the value creation and competitiveness of the firm.
- Analyze the role of technologies in the operations and innovation processes within the firm and conceive ways in which technologies can be applied in these processes.
- Analyze an organizational context focusing on the alignment between the organizational configuration and key operations or innovation choices.

#### *Competencies*

- Conceive and design an operations and innovation strategy aligned with the organizational context for manufacturing and service organizations, which achieves strategic fit with business and market requirements
- Conceive and design an operations and innovation strategy which makes use of technological opportunities and technologies

Type of instruction: The learning objectives are realised via lectures, discussions and case work (see chapter 3).

Exam format: Oral/written examination

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.2.4 Operations Management and Supply Chain Configuration – an Integrative Approach (15 ECTS)

Title: Operations Management and Supply Chain Configuration – an Integrative Approach (Konfigurering af produktionssystemer og værdikæder – en integrativ tilgang)

Justification: This project module attempt to integrate the external perspective from the course “*supply chain configuration*” with the internal perspective from the course “operations, innovation and organizational configuration” – in order to create consistent and coherent configuration of the supply and value chain of a manufacturing or service organization.

Objective: Upon completion of the project module, the student can:

#### *Knowledge*

- Account for how to link selected parts of operations, innovations and supply chain strategies with the aim of developing an integrated approach to the (re)configuration of the supply chain of an manufacturing or service organization in practice.
- Understand the role for and the deployment of technologies in the organization’s supply chain
- Explain how to overcome real life challenges connected to the (re)configuration of the organization’s supply chain.
- Show how to operationalize theoretical contributions to practical settings.

#### *Skills*

- Combine insights from the literature on operations, innovation and supply chain strategy for designing a company’s supply chain.
- Use insights from the literature to support supply chains management choices such as network configuration, degrees of integration and location methods
- Analyse the role of technologies in the organizations supply chain
- Write a well-structured project report, written with clear arguments including the following elements:
  - Develop and delimit an original formulation of the problem being investigated,
  - Critically explore and apply relevant theories and analytical approaches to the problem under investigation,
  - Assemble and process valid and reliable data, relevant to the problem and sub-problems under scrutiny,
  - Make a thorough, systematic, and comprehensive analysis of the problem under investigation
- Evaluate of the findings and recommendations/solutions, methods and, if relevant, considerations regarding the limitations and generalisability of the study.

#### *Competencies*

- Operationalize theoretical contributions in a practical setting

- Work together as a team to analyse and collect data in connection to problems that require an integration of operations, innovation and supply chain strategy in a real life setting
- Work together with an organisation in connection to identifying operations and/or supply chain strategies and identify different strategic scenarios.
- Integrate considerations on the deployment of technologies into the supply chain strategy of the organization

Type of instruction: The module is carried out as group-based, problem-oriented project work. The group work is carried out as an independent work process in which the students themselves organise and coordinate their workload in collaboration with a supervisor. The project is carried out in groups with normally no more than 6 members.

Exam format: Oral examination based on a written report.

Evaluation criteria: As stated in the Joint Programme Regulations.

## 3.3 2<sup>nd</sup> Semester

### 3.3.1 Supply Chain Technologies (5 ECTS)

Title: Supply Chain Technologies  
(Teknologier i værdikæden)

Recommended academic prerequisites:

This module is based on knowledge obtained in 1<sup>st</sup> Semester in Supply Chain Configuration

Justification: This course focuses on the technological opportunities and solutions which is necessary to implement and operate an efficient supply or value chain for a manufacturing or service organization.

Objective: Upon completion of the module, the student can:

#### *Knowledge*

- Account for key analytical techniques and methodologies used for developing decision support systems for supply chain (for example. econometric methods, optimization, simulation and heuristics)
- Explain the role of technology enabled decision support in demand forecasting, sourcing planning, supply chain network design, capacity planning, network master planning, production planning and scheduling, inventory management, logistics planning and distribution planning
- Understand the significance of analytical techniques in supply chain planning
- Understand how to analyze supply chain processes and identify opportunities for improvement
- Understand technology requirements and evaluate possible technology and analytical options for supply chain planning

#### *Skills*

- Map supply chain processes and identify areas for improvement.
- Evaluate possible technology and analytical options for supply chain planning
- Design effective technology enabled decision support systems for efficient supply chains

Type of instruction: The module is carried out via lectures, discussions and cases (see chapter 3).

Exam format: Oral/written examination

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.3.2 Operations, Innovation and Organizational Improvement: Implementation Models and Tools (5 ECTS)

Title: Operations, Innovation and Organizational Improvement: Implementation Models and Tools  
(Forbedring af produktion, innovation og organisation: Implementeringsmodeller og -værktøjer)

Recommended academic prerequisites

This module is based on knowledge obtained in 1<sup>st</sup> Semester in Operations, Innovation and Organizational Configuration

Justification The course focuses on how process improvement can be carried out in practice. Furthermore, in continuation of this, the course also focuses on how an organization can implement new processes and systems with success and in a way which creates value for the organization and key stakeholders.

Objective: Upon completion of the course, the student can:

#### *Knowledge:*

- Account for different process improvement methodologies and techniques in order to create efficient processes in the organization
- Explain how an organization can deploy technologies in the improvement and innovation processes of the organization
- Explain how to create, manage and implement technological and organizational changes within an organization including knowledge about how to manage technological change projects within an organization.
- Understand the challenges involved in implementing technological changes in an organization taking the organizational context into consideration

#### *Skills:*

- Evaluate and assess the need for improvement in key business processes in the organization
- Design or and re-design organizational and business processes in a manufacturing or service organization.
- Analyze the multifaceted challenges in connection with implementing technological innovations and process changes in an organization
- Design and plan efficient implementation processes of technological change in manufacturing or service organisations

#### *Competences:*

- Improve existing organizational and business processes using technologies and engineering methods in an manufacturing or service organization

Type of instruction: The module is carried out via lectures, discussions and cases (see chapter 3).

Exam format: Oral/written examination

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.3.3 Management Systems (5 ECTS)

Title: Management Systems  
(Ledelsessystemer)

Recommended academic prerequisites:

This module is based on knowledge obtained in 1<sup>st</sup> Semester in Operations, Innovation and Organizational Configuration and in Supply Chain Configuration.

Justification: The core idea in this course is to allow the students to work core business functions, processes and systems. Furthermore, the students should be able to improve these core business functions, processes and systems in a structured and systematic manner.

Objective: Upon completion of the module, the student can:

#### *Knowledge*

- Understand inter-relationships between business functions like R&D, internal operations and logistics and supply chain management
- Describe methods to assess the financial implications of decisions within core business functions
- Explain the possibilities to conduct risk management at functional and organizational level
- Understand the differences between functional and organizational performance management systems
- Account for cross-functional linkages between business functions for the efficient management in the global organization

#### *Skills*

- Identify improvement opportunities involving multiple functions in an organization and partners across the supply and value chain
- Evaluate suggestions for improvements across core business functions and across the supply and value chain in a structured and systematic manner
- Analyze the sources of risks across functions
- Configure functional and organizational performance management systems

#### *Competencies*

- Design efficient processes in logistics, supply chain, and new product development systems ensuring cross-functional integration, risk management.
- Develop a holistic performance management systems for individual functions and overall organization by understanding the impact of functional performance measures on overall corporate performance

Type of instruction: The module is carried out via lectures, discussions and cases (see chapter 3).

Exam format: Oral/written examination

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.3.4 Integrating Operations Management and Supply Chain Methods (15 ECTS)

Title: Integrating Operations Management and Supply Chain Methods  
(Integration af produktions og værdikæde metoder)

Justification: The idea in this project module is for the students to work with problems related to establishing the link between operations management technologies, techniques and tools with an internal focus with external supply chain methods with the aim of developing data driven, efficiency and technology oriented solutions for a manufacturing or service organization

Objective: Upon completion of the module, the student can:

#### *Knowledge*

- Describe how different methods and techniques can be applied in combination to increase the efficiency of the organization and its processes.
- Understand to role of technology as a key element in making organisations more efficient
- Explain how a manufacturing or service organization operations, innovation and supply chain strategy affects which tools are most applicable and/or relevant.

#### *Skills*

- Combine operations management and supply chain methods and demonstrate the solutions contribution to enhancing the efficiency of the company by applying practical tools from operations management and from the supply chain literature.
- Write a well-structured project report, written with clear arguments including the following elements:
  - Develop and delimit an original formulation of the problem being investigated,
  - Critically explore and apply relevant theories and analytical approaches to the problem under investigation,
  - Assemble and process valid and reliable data, relevant to the problem and sub-problems under scrutiny,
  - Make a thorough, systematic, and comprehensive analysis of the problem under investigation
- Evaluate the findings and recommendations/solutions, methods and, if relevant, considerations regarding the limitations and generalisability of the study.

#### *Competencies*

- Work together as a team to analyse and collect data in connection to problems that require an integration of operations management and supply chain management in practice
- Work together with a manufacturing or service organisation and to identify operations and/or supply chain management problems and finally develop data driven and robust solutions using technologies.
- Operationalize theoretical contributions in a practical setting

Type of instruction: The module is carried out as group-based, problem-oriented project work. The group work is carried out as an independent work process in which the students themselves

organise and coordinate their workload in collaboration with a supervisor. The project is carried out in groups with normally no more than 6 members.

Exam format: Oral examination based on a written report.

Evaluation criteria: As stated in the Joint Programme Regulations.

## 3.4 3<sup>rd</sup> Semester

### 3.4.1 Operations and Supply Chain Management (30 ECTS)

Title: Operations and Supply Chain Management  
(Produktions- og værdikædeledelse)

Recommended academic prerequisites:

The module adds to knowledge obtained in 1<sup>st</sup> and 2<sup>nd</sup> Semester

Objective: Upon completion of the module, the student can:

#### *Knowledge*

- Deep knowledge of the subject matter in the specific area of the project

#### *Skills*

- Evaluate the concepts, theories and methodologies applied in the solution of the problem
- Account for the choices made during the solution of the problem and substantiate that these are made on a high professional level
- Assess and evaluate the limitations of the concepts, theories and methodologies applied in the solution of the problem.
- Plan, execute and report an extensive individual research project within an agreed time frame
- Write a well-structured project report, written with clear arguments including the following elements:
  - Develop and delimit an original formulation of the problem being investigated,
  - Critically explore and apply relevant theories and analytical approaches to the problem under investigation,
  - Assemble and process valid and reliable data, relevant to the problem and sub-problems under scrutiny,
- Make a thorough, systematic, and comprehensive analysis of the problem under investigation
- Conduct technological development and research, and solve complicated technical problems using scientific methods

#### *Competences*

- Analyse and solve an actual problem of industrial relevance through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.
- Work together with a manufacturing or service organisation and to identify operations and/or supply chain management problems and finally develop data driven and robust solutions using technologies.

- Operationalize theoretical contributions in a practical setting
- Compare and critically evaluate the results of the project in relation to existing knowledge and accepted theories within the subject area
- Consider economic and other consequences of the proposed solutions
- Communicate a balanced view of the results and conclusions of the project in well-organized written and oral presentation

Organization: The project work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project may be carried out individually or in groups. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

Form of examination: Oral examination based on a written report

Evaluation criteria: As stated in the Joint Programme Regulations.

### 3.4.2 Academic Internship (30 ECTS)

Title: Academic Internship  
(Projektorienteret forløb i en virksomhed)

Recommended academic prerequisites:

The module adds to knowledge obtained in 1<sup>st</sup> and 2<sup>nd</sup> Semester

Objective: Upon completion of the module, the student can:

#### *Knowledge*

- Deep knowledge of the subject matter in the specific area of the project

#### *Skills*

- Evaluate the concepts, theories and methodologies applied in the solution of the problem
- Account for the choices made during the solution of the problem and substantiate that these are made on a high professional level
- Assess and evaluate the limitations of the concepts, theories and methodologies applied in the solution of the problem.
- Plan, execute and report an extensive individual research project within an agreed time frame
- Write a well-structured project report, written with clear arguments including the following elements:
  - Develop and delimit an original formulation of the problem being investigated,
  - Critically explore and apply relevant theories and analytical approaches to the problem under investigation,
  - Assemble and process valid and reliable data, relevant to the problem and sub-problems under scrutiny,
- Make a thorough, systematic, and comprehensive analysis of the problem under investigation
- Conduct technological development and research, and solve complicated technical problems using scientific methods

#### *Competences*

- Analyse and solve an actual problem of industrial relevance through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.
- Work together with a manufacturing or service organisation and to identify operations and/or supply chain management problems and finally develop data driven and robust solutions using technologies.
- Operationalize theoretical contributions in a practical setting
- Compare and critically evaluate the results of the project in relation to existing knowledge and accepted theories within the subject area

- Consider economic and other consequences of the proposed solutions
- Communicate a balanced view of the results and conclusions of the project in well-organized written and oral presentation

Organization: The student is included in the company's daily work and carry out independent project work on an industrial problem relevant for the company. Concurrent to the work in the company, the student makes a project report, which is evaluated after the ending of the internship.

Form of examination: Oral examination based on a written report

Evaluation criteria: As stated in the Joint Programme Regulations.

## 3.5 4<sup>th</sup> Semester

### 3.5.1 Master's Thesis (30, 60 ECTS)

Title: Master's Thesis  
(Kandidatspeciale)

The master thesis can be conducted as a long master thesis using both the 3<sup>rd</sup> and 4<sup>th</sup> semester. If choosing to do a long master thesis, it has to include experimental work and has to be approved by the study board. The amount of experimental work must reflect the allotted ECTS.

Recommended academic prerequisites:

The module adds to knowledge obtained in 1<sup>st</sup> – 3<sup>rd</sup> Semester

Goal: Upon completion of the project the student can:

#### *Knowledge*

- Deep knowledge of the subject matter in the specific area of the project

#### *Skills*

- Plan, execute and report an extensive individual research project within an agreed time frame
- Apply scientific methodology in solving a wide variety of problems within the field of specialisation
- Perform scientific work in relevant topics of the field of the specialisation
- Apply a wide range of technologies and engineering methods in research and development projects in the field of specialization
- Write a well-structured project report, written with clear arguments including the following elements:
  - Develop and delimit an original formulation of the problem being investigated,
  - Critically explore and apply relevant theories and analytical approaches to the problem under investigation,
  - Assemble and process valid and reliable data, relevant to the problem and sub-problems under scrutiny,
  - Make a thorough, systematic, and comprehensive analysis of the problem under investigation
- Participate in or lead projects within the fields of the specialisation.

#### *Competences*

- Plan, execute and report an extensive individual research project within an agreed time frame

- Conduct technological development and research, and solve complicated technical problems using scientific methods
- Work independently with a project on a complex problem within their field of interest on the highest possible level within their specialisation
- Take part in both discipline-specific and interdisciplinary cooperation to solved complex problems
- Compare and critically evaluate the results of the project in relation to existing knowledge and accepted theories within the subject area
- Consider economic consequences and impact on society, environmental and safety issues related to the project
- Communicate a balanced view of the results and conclusions of the project in well-organized written and oral presentation

Teaching Method: In this module, the Master's Thesis is carried out. The module constitutes independent project work and concludes the programme. Within the approved topic, the Master's Thesis must document that the level of the programme has been attained.

Form of examination: Oral examination with participation of an external examiner.

Evaluation criteria: As stated in the Joint Programme Regulations.

## Chapter 4: Entry into Force, Interim Provisions and Revision

The curriculum is approved by the Dean of the Faculty of Engineering and Science and enters into force as of September 2017.

Students who wish to complete their studies under the previous curriculum from 2015 must conclude their education by the summer examination period 2018 at the latest, since examinations under the previous curriculum are not offered after this time.

## Chapter 5: Other Provisions

### 5.1 Rules concerning Written Work, including the Master's Thesis

In the assessment of all written work, regardless of the language in which it is written, weight is also put on the student's spelling and formulation ability, in addition to the academic content. Orthographic and grammatical correctness as well as stylistic proficiency are considered basis for the evaluation of language performance. Language performance must always be included as an independent dimension of the total evaluation. However, no examination may be assessed as 'Pass' on the basis of language performance alone; similarly, an examination cannot normally be assessed as 'Fail' on the basis of poor language performance alone.

The Board of Studies can grant exemption from this in special cases (e.g., dyslexia or a native language other than Danish).

The Master's Thesis must include an English summary.<sup>1</sup> If it is written in English, the summary must be in Danish.<sup>2</sup> The summary must be at least one page and maximum two pages. The summary is included in the evaluation of the project as a whole.

### 5.2 Rules concerning Credit Transfer (merit), including the Possibility for Choice of Modules that are Part of another Programme at a University in Denmark or Abroad

The Board of Studies can approve successfully completed (passed) programme elements from other Master programmes in lieu of programme elements in this programme (credit transfer). The Board of Studies can also approve successfully completed (passed) programme elements from another Danish programme or a programme outside of Denmark at the same level in lieu of programme elements within this curriculum. Decisions on credit transfer are made by the Board of Studies based on an academic assessment. See the Joint programme regulations for the rules on credit transfer.

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<sup>1</sup> Or another foreign language (upon approval from the Board of Studies)

<sup>2</sup> The Board of Studies can grant exemption from this.

### **5.3 Rules for Examinations**

The rules for examinations are stated in the Examination Policies and Procedures published by the Faculty of Engineering and Science on their website.

### **5.4 Exemption**

In exceptional circumstances, the Board of Studies study can grant exemption from those parts of the curriculum that are not stipulated by law or ministerial order. Exemption regarding an examination applies to the immediate examination.

### **5.6 Rules and Requirements concerning the Reading of Texts in Foreign Languages and a Statement of the Foreign Language Knowledge this Assumes**

It is assumed that the student is able to read academic texts in modern English and use reference works, etc., in other European languages.

### **5.5 Additional Information**

The current version of the curriculum is published on the Board of Studies' website, including more detailed information about the programme and exams.